

In the Claims:RECEIVED
CENTRAL FAX CENTER

APR 17 2007

Claims 1 to 15 (Canceled).

1 16. (New) Method for milling a freeform surface on a workpiece
2 using a milling machine, whereby the workpiece is milled by
3 a tool of the milling machine in such a manner so that a
4 desired freeform surface is formed, and to carry out the
5 milling the tool is moved relative to the workpiece along
6 a tool path defined by splines, characterized in that the
7 splines are calculated from support points stored in
8 workpiece coordinates or in machine coordinates in a
9 CAD/CAM system, and, independent of the freeform surface to
10 be formed, the tool path is generated from six splines if
11 the support points are defined in workpiece coordinates,
12 and is generated from five splines if the support points
13 are defined in machine coordinates, whereby one independent
14 spline is produced for each coordinate.

1 17. (New) Method according to claim 16, characterized in that,
2 for each tool path, the splines are calculated through the
3 use of one or more interpolation parameters which are equal
4 for all of the splines of the respective tool path, so that
5 all of the splines of the respective tool path are
6 synchronized with one another.

1 18. (New) Apparatus for milling a freeform surface on a
2 workpiece, whereby a tool is adapted to mill the workpiece
3 in such a manner so that a desired freeform surface is
4 formed, comprising a programming arrangement (21) for
5 programming a tool path, and comprising at least one
6 control arrangement (28) for controlling a motion of the
7 tool relative to the workpiece along the tool path defined
8 by splines, characterized in that the programming
9 arrangement (21) is embodied as a CAD/CAM system, and
10 further comprising means (25) allocated to the programming
11 arrangement (21) and adapted to calculate the splines from
12 support points stored in workpiece coordinates or machine
13 coordinates in the CAD/CAM system in such a manner so that
14 the means (25), independent of the freeform surface to be
15 formed, are adapted to generate the tool path from six
16 splines if the support points are defined in workpiece
17 coordinates, and from five splines if the support points
18 are defined in machine coordinates, whereby an independent
19 spline is produced for each coordinate, and wherein the
20 CAD/CAM system is adapted to produce at least one APT file
21 (22), and further comprising at least one
22 downstream-connected post-processor (26) adapted to convert
23 the at least one APT file into at least one control file
24 (27) that is executable by the or each control arrangement
25 (28), and whereby the or each control arrangement (28) is
26 adapted to control the motion of the tool along the tool
27 path in accordance with the splines.

1 19. (New) Apparatus according to claim 18, further comprising
2 an APT processor (23), characterized in that the means (25)
3 allocated to the programming arrangement (21) are arranged
4 and adapted to transfer the splines to the APT processor
5 (23) which is arranged and adapted to transfer the splines
6 to the or each post-processor (26), whereby the or each
7 post-processor (26) is arranged and adapted to provide the
8 splines to the or each control arrangement (28) in a
9 polynomial format.

1 20. (New) A method of milling a freeform surface on a workpiece
2 using a miller tool, comprising the steps:
3 a) defining tool path way points, each respectively in
4 six workpiece coordinates or five machine coordinates,
5 wherein said way points define points within tolerance
6 limits along a contour of a nominal freeform surface
7 that is to be milled;
8 b) generating a plurality of splines dependent on and
9 fitting said way points sufficiently closely to remain
10 within said tolerance limits of said contour, wherein
11 a respective independent one of said splines is
12 respectively generated for each one of said workpiece
13 coordinates or said machine coordinates of all of said
14 way points, so that said plurality of splines includes
15 a total of six splines respectively allocated to said
16 six workpiece coordinates if said way points are
17 defined in said six workpiece coordinates, and said
18 plurality of splines includes a total of five splines

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19 respectively allocated to said five machine
20 coordinates if said way points are defined in said
21 five machine coordinates; and
22 c) moving said miller tool in contact with and relative
23 to said workpiece so that said miller tool mills said
24 workpiece, and controlling said moving of said miller
25 tool in accordance with said plurality of splines
26 respectively allocated to said workpiece coordinates
27 or said machine coordinates so that said miller tool
28 moves along a tool path defined by said splines in
29 said workpiece coordinates or said machine coordinates
30 and thereby mills an actual freeform surface on said
31 workpiece within said tolerance limits of said contour
32 of said nominal freeform surface.

1 21. (New) An apparatus for milling a freeform surface on a
2 workpiece, comprising:
3 a movable miller tool that is movable relative to the
4 workpiece;
5 plural control arrangements respectively adapted to
6 control a motion of said miller tool respectively in six
7 workpiece coordinates or in five machine coordinates;
8 a programming arrangement programed to define tool
9 path way points in said six workpiece coordinates or in
10 said five machine coordinates, wherein said way points
11 define points within tolerance limits along a contour of a
12 nominal freeform surface that is to be milled;

13 a processing arrangement that is interposed between
14 said programming arrangement and said control arrangements,
15 and that is adapted and programmed to generate a plurality
16 of splines dependent on and fitting said way points
17 sufficiently closely to remain within said tolerance limits
18 of said contour, wherein a respective independent one of
19 said splines is respectively to be generated for each one
20 of said workpiece coordinates or said machine coordinates
21 of all of said way points, so that said plurality of
22 splines includes a total of six splines respectively
23 allocated to said six workpiece coordinates if said way
24 points are defined in said six workpiece coordinates, and
25 said plurality of splines includes a total of five splines
26 respectively allocated to said five machine coordinates if
27 said way points are defined in said five machine
28 coordinates; and

29 wherein said control arrangements are adapted to
30 control the motion of said miller tool in accordance with
31 said plurality of splines respectively allocated to said
32 workpiece coordinates or said machine coordinates so that
33 said miller tool is adapted to move along a tool path
34 defined by said splines in said workpiece coordinates or
35 said machine coordinates and thereby to mill an actual
36 freeform surface on said workpiece within said tolerance
37 limits of said contour of said nominal freeform surface.